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Natural Gas For Vehicles
Industry Survey 1986

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EXECUTIVE SUMMARY

This report is an update of the 1985 report "Natural Gas for Vehicles Industry Survey", and includes information derived from Natural Gas Vehicles Program data and telephone interviews with conversion companies. According to the telephone survey, approximately 8,418 vehicles were converted between April, 1985, and August 1986, compared to 6,333 reported by the Program data for the same period.

The total number of conversions in Canada under the Natural Gas Vehicle Program (and the earlier CNG Demonstration Program) was 3309 vehicles at the end of May, 1985. By the end of August, 1986, the total number of converted vehicles had risen to 9518 (again inclusive of the CNG Demonstration Program figures). By the end of January, 1987, program figures showed a total of 11,404 converted vehicles. Program data reveal that British Columbia and Quebec are the provinces where the natural gas vehicle industry is still the most active.

Private use vehicles make up a substantial proportion of converted vehicles under the Program. In 1985, private vehicles made up 18% of the total conversions. By August, 1986, this figure had risen to 34.3%, followed by service industries (22%). This scenario changes from one province to another and a breakdown by province is provided in the report. Overall, automobiles make up 35% of the vehicles converted under the Program, followed by pickup trucks and vans.

According to the National Energy Board's Report on Canadian Energy Supply and Demand 1980-2005, the total use of natural gas in Canada is projected to grow from 52.5 billion cubic metres in 1984 to 88.8 billion cubic metres and 78.0 billion cubic metres in 2005 in the high and low oil price cases respectively. This represents a 2.5 and 2.0 percent average growth rate respectively.

Established reserves of natural gas at year end 1984 included 2126 billion cubic metres mainly in western Canada, 161.5 billion cubic metres in the MacKenzie Delta area and 323 billion cubic metres in the Arctic Islands.

Canadian natural gas exports will rise from their 1985 level of 26 billion cubic metres to approximately 38 billion cubic metres by 1990. To maintain high levels of exports beyond the early 1990's would likely require production from frontier export sources.

RÉSUMÉ À L'INTENTION DE LA DIRECTION

Le présent rapport constitue une mise à jour du document intitulé Natural Gas for Vehicles Industry Survey, paru en 1985, et renferme des informations tirées des résultats du Programme des véhicules au gaz naturel (PVGN) et d'interviews téléphoniques réalisées auprès des entreprises de conversion. Selon le sondage téléphonique, environ 8 418 véhicules ont été convertis au gaz naturel entre les mois d'avril et août 1986, comparativement aux 6,333 véhicules mentionnés dans le rapport du PVGN pour la même période.

Le nombre total de conversions en vertu du PVGN (et de l'ancien Programme de démonstration du gaz naturel comprimé) s'élevait à 3 309 à la fin de mai 1985. À la fin d'août 1986, le nombre total de véhicules modifiés était passé à 9 518 (ce qui comprend les véhicules convertis en vertu du Programme de démonstration du gaz naturel comprimé). À la fin de janvier 1987, on dénombrait 11 404 véhicules au gaz naturel. Les données tirées du PVGN révèlent que ce sont le Québec et la Colombie-Britannique qui comptent le plus de véhicules au gaz naturel.

Les véhicules privés représentent une proportion importante des véhicules modifiés en vertu du PVGN. En 1985, ils intervenaient pour 18 % du nombre total de véhicules convertis. En août 1986, la proportion était passée à 34.3 %, les industries de services venant au second rang, avec 22 %. Ce scénario varie d'une province à l'autre et c'est pourquoi une ventilation par province est fournie dans le rapport. En général, les automobiles comptent pour 35 % des véhicules modifiés en vertu du PVGN, devançant les camionnettes et les fourgonnettes.

Selon le rapport de l'Office national de l'énergie intitulé L'Énergie au Canada, Offre et demande, 1985-2005, l'utilisation totale du gaz naturel au Canada passera de 52,5 milliards de mètres cubes en 1984 à 88,8 milliards de mètres cubes et 78,0 milliards de mètres cubes en 2005 pour ce qui est des scénarios des prix bas et des prix élevés respectivement. Il s'agit là d'un taux de croissance annuel moyen de 2,5 et de 2,0 pour cent respectivement.

À la fin de 1984, les réserves établies de gaz naturel comprenaient 2 126 milliards de mètres cubes principalement dans l'Ouest du Canada, 161,5 milliards de mètres cubes dans la région du delta du MacKenzie et 323 milliards de mètres cubes dans les îles de l'Arctique.

Les exportations de gaz naturel augmenteront entre 1985 et 1990, passant de 26 milliards de mètres cubes à environ 38 milliards de mètres cubes. Il faudra probablement tirer une production des régions domaniales si l'on veut maintenir ces niveaux élevés d'exportations au-delà du début des années 90.

I INTRODUCTION

This report is an update of the 1985 report entitled Natural Gas for Vehicles Industry Survey. The intent of this report is to review the key aspects of the natural gas carburetion market, focussing specifically on market growth, consumer characteristics, industry activity, consumer reaction to natural gas, and factors affecting natural gas pricing and supply.

The report includes information derived from the following sources: Natural Gas Vehicle Program data, telephone interviews with approximately 60 natural gas conversion companies and information provided by the Oil Pricing and Marketing Division of Energy, Mines and Resources Canada. The topics covered are: promotion, target clientele, supply and demand forecasts and price comparison.

The existing EMR conversion grant of $500 and the Natural Gas Fueling Station program contribution of $50,000 have been incentives to encourage the use of natural gas as an alternative transportation fuel.

Under the Natural Gas Fueling Station Program, a total of 191 fueling station applications were approved by November 1985. British Columbia has the highest number of approved stations under the program with Ontario and Quebec in the second and third place respectively.

The federal Natural Gas Vehicle Program will continue until March 31, 1987. All individuals, corporations and organizations permanently resident in Canada, with the exception of federal and provincial departments, agencies and crown corporations, are eligible to apply for the $500 taxable contribution. Both single and dual fuel systems are allowed under the Program.

The Provincial governments are also actively involved in incentive programs. British Columbia and Ontario do not charge sales tax on conversion kits. Furthermore, in Ontario there is a sales tax rebate of up to $1,000.00 on a vehicle converted to natural gas within ninety days of purchase (The contract for the conversion must, however, be negotiated within 30 days of purchase). In British Columbia, until March 31, 1987, private vehicles converted by a certified conversion shop are eligible for a provincial grant of $200.00, except for vehicles belonging to a commercial fleet of two or more. Other provincial initiatives include the elimination of road taxes for natural gas vehicles in British Columbia, Ontario and Quebec.

In addition, many utility companies throughout the country offer grants and financial packages to encourage the development of natural gas fueling facilities and vehicle conversions.

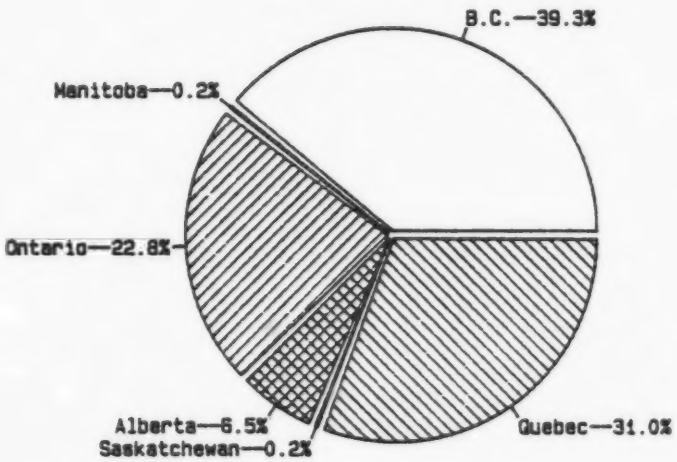
II NATURAL GAS VEHICLE PROGRAM DATA

The Natural Gas Vehicle Program generates a substantial data bank which includes information on Program take-up, claimant type, and vehicle type. Figures are also available on the conversion type (whether the conversion was done before or after the vehicle was purchased).

To August 1986, contributions had been paid out for 9518 vehicles under the Program (including the CNG Demonstration Program). The distribution of vehicles by province is shown in Figure 1 as percentages only.

The NGV program data indicates that as of December 1986, 11,404 NG vehicles were operating in Canada (including demonstration program figures).

Figure 1
Natural Gas Vehicle Program
Vehicles Converted by Regional Distribution
to August 31, 1986



Number of conversions 9,518 (including demonstration program)
Source: EMR/TEB

Figure 2 gives the actual number of conversions by province.

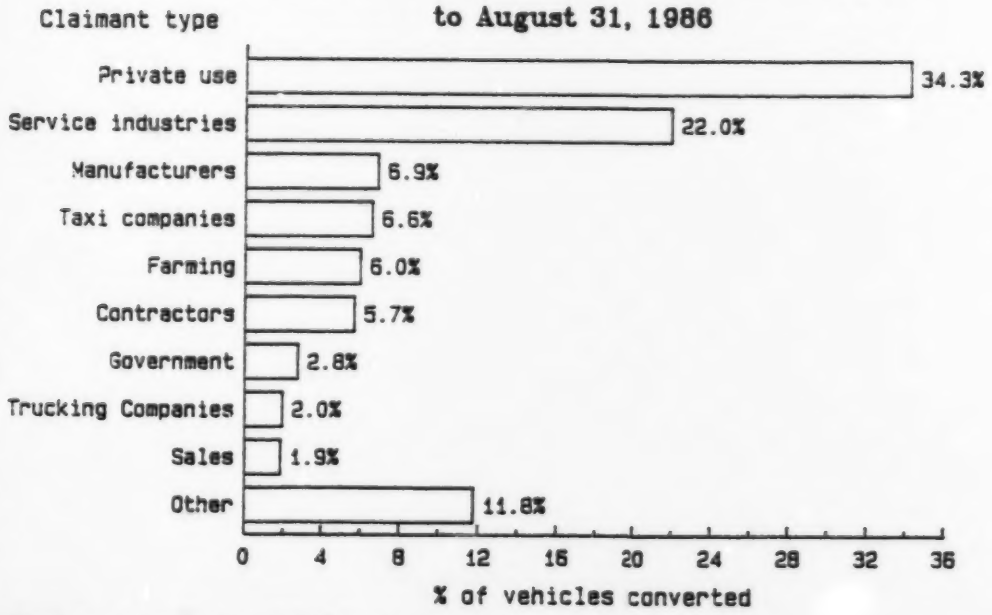
FIGURE 2

Natural Gas Vehicle Program
Vehicles converted - Regional Distribution
To August 31, 1986

Province	CNG Demo Program	Natural Gas Vehicle Program	Total
Québec	94	2858	2952
Ontario	81	2095	2176
Sask.	10	6	16
Alberta	51	565	616
B.C.	254	3489	3743
Manitoba		15	15
Totals	490	9028	9518

Figure 3 indicates on a national basis the types of organizations that have been converting their vehicles to natural gas, as well as the percentage of private individuals who have done so. It is interesting to note that 34.3% percent of all vehicles converted under the Program to August 31st, 1986 were privately owned. The category called "Other" includes all applicants who did not supply a claimant type, as well as utilities and such industries as mining and oil and gas exploration that do not fit under any of the given categories. Following private usage vehicles (34.3%), the service industries (22.0%) account for a major portion of the vehicles converted, then manufacturers (6.9%) and taxis (6.6%).

Figure 3
Natural Gas Vehicle Program
Vehicles Converted by Claimant Type
to August 31, 1986



Number of conversions 9,028 (not including demonstration program)
Source: EMR/TEB

Figure 4 is a further breakdown of claimant type by province.

FIGURE 4

Natural Gas Vehicle Program
Claimant Type By Province
To August 31, 1986

	PROVINCE					
	Quebec %	Ontario %	Sask. %	Alberta %	B.C. %	Manitoba %
Taxi Company	14.1	1.9		5.0	3.7	
Trucking Company	2.9	0.5		0.3	2.6	
Manufacturer Wholesaler Retailer	6.5	6.8		5.0	7.6	
Contractor	5.8	4.7		0.3	7.0	
Service Industry	14.4	42.0	33.3	14.7	17.0	100
Sales (Direct Sales Salesman)	1.6	2.2		0.1	2.0	
Private Use	38.7	25.3		1.8	41.5	
Farming	4.2	3.3		0.1	10.2	
Municipal Or Other Government Authority	3.7	2.3	50.0	0.7	2.7	
Other	8.0	10.5	16.7	72.0	5.5	
Not Supplied	0.1	0.5	-	-	0.2	
	100	100	100	100	100	100

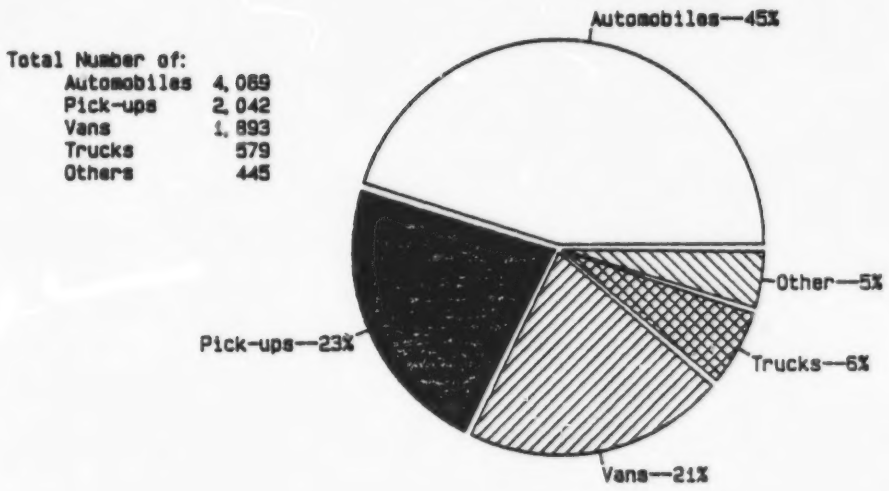
Figures 5 and 6 depict the conversions by vehicle type, Figure 5 giving an overall national summary, and Figure 6 being the detailed breakdown by province.

FIGURE 5

VEHICLE DISTRIBUTION - VEHICLE TYPE (to Sept. 31, 1986).
9028 natural gas vehicles distributed as follows:

Automobile	4 cylinder	1,158		
	6 cylinder	870		
	8 cylinder	2,041		
			4,069	45%
Pick-up	under 6000 GVW	1,492		
	over 6000 GVW	550		
			2,042	23%
Van	under 10000 GVW	1,760		
	over 10000 GVW	133		
			1,893	21%
Trucks	under 10000 GVW	210		
	under 14000 GVW	189		
	under 16000 GVW	19		
	under 19000 GVW	19		
	under 26000 GVW	82		
	under 33000 GVW	45		
	over 33000 GVW	15		
			579	6%
Transit Buses		8		
School Buses		322		
Not Supplied Vehicles		95		
Others (vehicle not identified)		18		
Unlicenced Farm		2		
			445	5%
		9,028	9,028	100%

Figure 5
Natural Gas Vehicle Program
Vehicles Converted by Vehicle Type
to August 31, 1986



Number of conversions 9,028 (not including demonstration program)
Source: EMR/TEB

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FIGURE 6

Natural Gas Vehicle Program
Vehicle Type By Province
August 31, 1986

	Québec %	Ontario %	Alberta %	B.C. %	Manitoba %	Sask. %
Automobile 4 cylinder	19.9	19.9	1.2	4.7	6.7	-
Automobile 6 cylinder	14.4	11.4	7.9	5.0	6.7	-
Automobile 8 cylinder	30.8	11.0	8.1	25.3	-	16.7
Pick-up under 6000 GVW	15.6	14.7	22.8	17.5	20.0	16.7
Pick-up over 6000 GVW	2.2	3.0	19.0	9.0	6.7	16.7
Van under 10000 GVW	7.8	26.0	13.0	26.2	26.6	33.2
Van over 10000 GVW	0.3	0.9	0.5	3.0	-	-
Trucks under 10000 GVW	1.9	3.0	0.1	2.7	-	-
Trucks under 14000 GVW	2.4	2.8	0.1	1.7	6.7	16.7
Trucks under 16000 GVW	-	0.2	-	0.3	26.6	-
Trucks under 19000 GVW	0.1	0.4	-	0.2	-	-
Trucks under 26000 GVW	0.3	1.7	-	1.1	-	-
Trucks under 33000 GVW	0.3	0.7	0.5	0.5	-	-
Trucks over 33000 GVW	-	0.2	-	0.3	-	-
Diesel	-	-	-	-	-	-
Transit Buses	0.1	-	-	0.1	-	-
School Buses	2.5	2.4	26.7	1.4	-	-
Not Supplied Vehicles	1.3	1.6	0.1	0.7	-	-
Other (Vehicles not identified)	0.1	0.1	-	0.3	-	-
TOTAL	100 %	100 %	100 %	100 %	100 %	100 %

* Demonstration Program figures not included.

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Overall 97% of the natural gas vehicles were converted after being purchased and only 2.2% prior to purchase (.8% not supplied). The B.C., Quebec and Ontario conversion figures compare to the national average as follows:

	after purchase	prior purchase	not supplied
B.C. -	99.0%	.5%	.5%
Quebec -	99.4%	-	.6%
Ontario -	89.8%	8.6%	1.6%

The mean cost of conversion is shown in Figure 7 by province and vehicle type. It should be noted that in the larger truck categories the number of vehicles is very low.

FIGURE 7

Natural Gas Vehicle Program
Mean Conversion Cost by Vehicle Type
to August 31, 1986

VEHICLE TYPE	QUEBEC	ONTARIO	MANITOBA	SASKATCHEWAN	ALBERTA	B.C.
Automobile 4 cylinder	1,809.47	2,140.46	2,245.06	-	2,020.40	2,104.75
Automobile 6 cylinder	2,000.58	2,210.09	1,997.64	-	1,940.50	2,318.54
Automobile 8 cylinder	2,120.65	2,392.44	-	2,200.00	2,346.31	2,409.33
Pick-up under 6000 lbs.	2,231.67	2,401.32	2,773.45	3,354.68	2,763.31	2,477.09
Pick-up over 6000 lbs.	2,384.31	2,910.39	3,201.49	2,173.11	2,728.40	2,618.97
Van under 10000 lbs.	2,182.00	2,609.77	2,848.71	2,150.00	3,001.41	2,728.32
Van over 10000 lbs.	2,560.09	2,899.22	-	-	4,308.48	2,961.48
Trucks under 10000 lbs.	2,596.18	2,864.26	-	-	2,350.00	2,755.09
Trucks under 14000 lbs.	2,549.55	2,962.99	3,576.69	3,354.68	3,104.68	2,720.19
Trucks under 16000 lbs.	-	3,837.40	3,079.65	-	-	3,225.04
Trucks under 19000 lbs.	2,779.49	3,375.32	-	-	-	3,072.23
Trucks under 26000 lbs.	3,785.00	3,329.54	-	-	-	3,520.92
Trucks under 33000 lbs.	3,257.16	3,947.16	-	-	3,080.14	3,361.84
Trucks over 33000 lbs.	-	3,521.90	-	-	-	4,082.45
Other Vehicles	2,470.60	2,900.56	-	-	-	3,129.90
Transit Buses	3,152.77	2,450.41	-	-	-	3,560.33
School Buses	3,132.44	2,689.43	-	-	1,121.53	3,020.95
Diesel	-	2,478.39	-	-	-	
Unlicenced Farm	-	-	-	-	-	2,570.00

III INSTALLER SURVEY REPORT

Number of Conversions

A survey of approximately 60 conversion centres registered in the NGV Program database was carried out, covering the period of April 1, 1985 to August 31, 1986. According to the survey, approximately 8418 vehicles were converted in this period, which is proportionally higher than the conversions reported in the Program data (6.333). This is consistent with the information provided in the 1985 survey. Possible reasons for the telephone survey indicating a higher number of conversions than the Program data are:

- Provincial government vehicles are not eligible for grants,
- Some individuals choose not to apply for the grant,
- Grant application processing takes time, therefore, reporting may not be up to date.

Comments from the Installers

Some of the smaller installers reported that their business is on the decline because of the distance from the closest fueling station and the increasing price of conversion is no longer attracting individuals to convert.

Most of the larger companies, however, indicate steady or improved business, directly attributed to stepped up promotion and their subsidizing conversions over a certain period of time.

IV FACTORS AFFECTING NATURAL GAS PRICES

An Agreement to deregulate natural gas prices was signed on October 31, 1985. Since November 1986, all Canadian natural gas prices have been fully deregulated by the federal government and are freely negotiated between buyers and sellers.

Prior to deregulation, wholesale prices of natural gas in Canada were regulated from 1975 as a function of crude oil prices. Between 1975 and 1981, natural gas was priced at 85% of the price of crude oil. Between 1981 and 1985, the ratio was reduced to 65%.

In March 1985 the federal government, Alberta, British Columbia and Saskatchewan signed the Western Accord, which undertook to develop a more market sensitve pricing mechanism. On October 31, 1985, the same governments concluded the agreement on natural gas markets and prices. The objective of the agreement was to implement a more market sensitive pricing regime for natural gas starting November 1, 1986. The purpose of the agreement was to bring together buyers and sellers of natural gas to negotiate competitive prices.

Since November 1, 1986, buyers of natural gas seeking new suppliers have been able to negotiate freely with brokers and producers on the price and other contract terms. To date, many direct sales have been completed at significant discounts. Consumers who purchase gas on this basis must arrange transportation and distribution of their gas themselves.

The October 31, 1985 Agreement froze the price of gas that was already under contract at the time of the Agreement at $3.00/MCF. This price remained in effect until November 1, 1986 when all regulation of prices ended. At that point, prices of long term contracts or system gas had also been negotiated. These contracts are largely held by distributors.

During the transition period of 1985-86, however, discounts from the regulated price of system gas were allowed. These discounts are referred to as competitive marketing programs (CMPs) and are negotiated with the end user. As of October 1986, 106 contracts worth more than $160.4 million had been negotiated with end users.

In the future many more factors will influence natural gas prices, and while oil prices will continue to be a factor they will be less important than in the past. A growing importance will be the influence of "Gas to Gas" competition. It is through this competition that the forces of supply are brought to bear on prices. More and more, the strong supply base of natural gas in Western Canada will influence prices.

Another factor which is going to have a growing importance on Canadian natural gas prices is export prices. Producers have been given greater access to export markets with the condition that exporters cannot

sell Canadian gas for less than it is sold in Canada, measured on a regional basis.

It is predicted that in the future, US natural gas prices will have a growing influence on domestic gas prices.

In the preparation of the forecast of natural gas prices, the following points should be considered:

- the extent of "Gas to Gas" competition and the amount that gas supply exceeds gas demand
- the prices of alternative fuels - not crude oil. Natural gas does not compete with crude, but oil products, particularly heavy fuel oil, and heating oil and electricity
- natural gas export prices which are largely determined by heavy fuel oil and heating oil prices.

APPENDIX 1

Natural Gas Fueling Station Prices
by Provinces

PETROLEUM PRODUCT MARKETING
Oil Pricing and Market Analysis Division
OB/EMR, Ottawa
(613) 995-2500

NATURAL GAS FUELING STATION PRICES

		Jan./86	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan./87
British Columbia														
- Husky Oil (Vancouver, B.C.)	¢/KG	44.9	44.9	44.9	44.9	44.9	44.9	44.9	41.9	41.9	41.9	41.9	41.9	41.9
- Black Top & Blue Cabs (Vancouver, B.C.)	¢/KG	43.0	43.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0
- Doug Logan's (P.C.) (Richmond, B.C.)	¢/KG	44.9	44.9	44.9	44.9	44.9	44.9	44.9	41.9	41.9	41.9	41.9	41.9	41.9
- Sahali Mohawk Oil (Kamloops, B.C.)	¢/KG	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2	41.2
- National Energy Equipment (Burnaby, B.C.)	¢/KG	42.0	42.0	42.0	42.0	42.0	37.7	43.4	43.4	43.4	43.4	43.4	43.4	43.4
- Tundra Turbos (Fort St. John, B.C.)	¢/KG	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	39.9	39.9	39.9	37.9	37.9
- Husky Oil (Hapleridge, B.C.)	¢/KG	44.9	44.9	44.9	44.9	44.9	44.9	44.9	41.9	41.9	41.9	41.9	41.9	41.9
- FarWest Fuels (Terrace, B.C.)	¢/KG	49.0	49.0	49.0	49.0	49.0	49.0	46.0	46.0	46.0	46.0	46.0	46.0	46.0
- Vernon Husky (Vernon, B.C.)	¢/KG	44.9	44.9	44.9	44.9	44.9	44.9	44.9	44.9	44.9	44.9	44.9	44.9	44.9
- Yellow Cab Co. Ltd. (Vancouver, B.C.)	¢/KG	42.9	42.9	42.9	42.9	42.9	42.9	42.9	42.9	42.9	42.9	42.9	42.9	42.9
- Airport Gulf Service (Vancouver, B.C.)	¢/KG	44.9	44.9	44.9	44.9	44.9	44.9	44.9	44.9	41.9	41.9	41.9	41.9	41.9
- Husky Service (Langley, B.C.)	¢/KG	44.9	44.9	44.9	44.9	44.9	44.9	44.9	41.9	41.9	41.9	41.9	41.9	41.9
- H & G Auto-Conversion Centre (Prince George, B.C.)	¢/KG	-		-	-	-	43.0	43.0	43.0	41.6	41.6	41.6	41.6	41.6
- Westwood Shell Service (Coquitlam, B.C.)	¢/KG	-		-	-	-	44.9	44.9	44.9	42.5	42.5	42.5	42.5	42.5
- North Road Esso (Burnaby, B.C.)	¢/KG			-	-	-	44.9	44.9	44.9	44.9	41.9	41.9	41.9	41.9

PETROLEUM PRODUCT MARKETING
Oil Pricing and Market Analysis Division
OB/KMR, Ottawa
(613) 995-2500.

NATURAL GAS FUELING STATION PRICES (continued)

		Jan./86	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan./87
- Arbutus Shell (Vancouver, B.C.)	¢/KG	-			-	-	44.9	44.9	44.9	42.5	42.5	42.5	42.5	42.5
- ICG Energy Centre (Chilliwack, B.C.)	¢/KG	-			-	-	42.0	42.0	42.0	42.0	40.0	40.0	40.0	40.0
- Surrey Centre Shell Service (Surrey, B.C.)	¢/KG	-			-	-	44.9	44.9	44.9	42.5	42.5	42.5	42.5	42.5
- Freeway Shell (Burnaby, B.C.)	¢/KG	-			-	-	44.9	44.9	44.9	42.5	42.5	42.5	42.5	42.5
- Far West Fuels (Prince Rupert, B.C.)	¢/KG	-			-	-	28.5/L	28.5/L	26.7/L	46.0	46.0	46.0	46.0	46.0
- Happy Face Enterprises (Langley, B.C.)	¢/KG				-	-	43.0	43.0	43.0	41.5	41.5	41.5	41.5	41.5
- Hal Holdings (Abbotsford, B.C.)	¢/KG	-			-	-	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0
- Capilano Texaco (North Vancouver, B.C.)	¢/KG	-			-	-	44.9	44.9	41.9	41.9	41.9	41.9	41.9	41.9
Alberta														
- Husky Oil (Calgary, Alb.)	¢/KG	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0
- Palliser Square Husky Oil Service (Calgary, Alb.)	¢/KG	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0
Saskatchewan														
- CNG Autoenergy (Regina, Sask.)	¢/KG	39.5	39.5	39.5	39.5	39.5	-	-	-	-	-	-	-	-
Ontario														
- Shell Station (Toronto, Ont.)	¢/KG	43.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	41.9	41.9	41.9	41.9	41.9

Oil Pricing and Market Analysis Division
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(613) 995-2500

NATURAL GAS FUELING STATION PRICES (continued)

		Jan./86	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan./87
- Multi Fuel Marts (Ottawa, Ont.)	¢/KG	46.9	46.9	46.9	46.9	46.9	46.9	46.9	46.9	40.8	40.8	40.8	40.8	40.8
- S. Anglin (Kingston, Ont.)	¢/KG	43.9	43.9	43.9	43.9	38.9	38.9	38.9	38.9	38.9	38.9	38.9	38.9	38.9
- Save U Gas Bar (London, Ont.)	¢/KG	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
- L'il Papa's (Chatham, Ont.)	¢/KG	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
- Union Gas (Hamilton, Ont.)	¢/KG	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0
- Pro-Gas (North Bay, Ont.)	¢/KG	42.9	42.9	42.9	42.9	42.9	42.9	42.9	42.9	42.9	42.9	42.9	42.9	42.9
- Shell Canada (North York, Ont.)	¢/KG	43.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	41.9	41.9	41.9	41.9	41.9
- Davey-Mei Fuels (Sudbury, Ont.)	¢/KG	43.9	43.9	43.9	43.9	43.9	43.9	41.7	41.7	41.7	41.7	41.7	41.7	42.8
- Shell Canada (Etobicoke, Ont.)	¢/KG	43.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	41.9	41.9	41.9	41.9	41.9
- Fiba Canning (Scarborough, Ont.)	¢/KG	43.9	43.9	43.9	43.9	43.9	43.9	43.9	43.9	39.5	39.5	39.5	39.5	39.5
- Shell Rapid-Lube (Mississauga, Ont.)	¢/KG	43.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	41.9	41.9	41.9	41.9	41.9
- Petro-Canada (St. Catherines, Ont.)	¢/KG	43.9	43.9	43.9	43.9	43.9	43.9	43.9	43.9	39.9	39.9	39.9	39.9	39.9
- Shell Service (Scarborough, Ont.)	¢/KG	43.9	45.9	45.9	45.9	45.9	45.9	45.9	45.9	41.9	41.9	41.9	41.9	41.9
- Petro-Canada (Agincourt, Ont.)	¢/KG	43.9	43.9	43.9	43.9	43.9	43.9	43.9	43.9	39.9	39.9	39.9	39.9	39.9
- Devonshire Shell (Windsor, Ont.)	¢/KG	-	-	-	-	-	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0
- Beaver Shell (Toronto, Ont.)	¢/KG	-	-	-	-	-	45.9	45.9	45.9	41.9	41.9	41.9	41.9	41.9

Oil Pricing and Market Analysis Division
OB/KMR, Ottawa
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NATURAL GAS FUELING STATION PRICES (concluded)

		Jan./86	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan./87
Quebec:														
- Centre Shell (St.-Léonard, P.Q.)	¢/KG	59.5	59.5	59.5	59.5	59.5	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1
- Shell Station (St.-Laurent, P.Q.)	¢/KG	59.5	59.5	59.5	59.5	59.5	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1
- Ultramar (Longueuil)	¢/KG	59.5	59.5	59.5	59.5	59.5	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1
- Ultramar (Trois Rivieres)	¢/KG	59.5	59.5	59.5	59.5	59.5	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1
- Shell (Montreal-North)	¢/KG	59.5	59.5	59.5	59.5	59.5	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1
- Gulf (Sainte-Foy)	¢/KG	59.5	59.5	59.5	59.5	59.5	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1
- Station Gulf (Dorval, P.Q.)	¢/KG	59.5	59.5	59.5	59.5	59.5	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1
- Station Shell (Lasalle, P.Q.)	¢/KG	59.5	59.5	59.5	59.5	59.5	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1
- Station Ultramar (Montreal, P.Q.)	¢/KG	-			-	-	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1
- Station Shell (Laval, P.Q.)	¢/KG				-	-	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1
- Station Ultramar (Rouyn-Noranda, P.Q.)	¢/KG	-			-	-	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1
- Station Shell (Montreal, P.Q.)	¢/KG	-			-	-	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1
- Taxi Co-Op Que. (Limoilu, P.Q.)	¢/KG	-			-	-	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1
- Garage Provost (Boucherville, P.Q.)	¢/KG	-			-	-	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1
- Station Shell (Sherbrooke, P.Q.)	¢/KG	-		-	-	-	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1

APPENDIX 2

List of
Public Natural Gas Fueling Stations
by Provinces

BRITISH COLUMBIA

ABBOTSFORD
Hal's Esso Service
1915 McCallum Road

ALDERGROVE
Otter Co-op Fuel Centre
24795 Fraser Highway and 248th Street

BURNABY
John F. Adams & Son Ltd.
3267 Norland Ave.

Freeway Shell Service
Canada Way and Willingdon Avenue

North Road Esso Service
3965 North Road

National Energy Equipment
7353 - 6th Street

CHILLIWACK
ICG Energy Centre
45630 Yale Road

East-Chilliwack Co-op
46255 Chilliwack Central Road

CLOVERDALE
Coverdale Chevron
17790-56th Avenue

COQUITLAM
Westwood Shell Service
Lougheed Highway and Westwood St.

FORT NELSON
Tundra Turbos
4307 - 50th Street

FORT ST. JOHN
Tundra Turbos
7904 - 101 Avenue

KAMPLOOPS
Sahali Mohawk Service
844 West Columbia Street

KELOWNA
Don Folk Esso
2380 Highway 97 North

KITIMAT
Far West Fuels
780 Lahakas Blvd.

LANGLEY
Husky Service
19811 Fraser Highway at Highway 10

Happy Face Esso
8590 - 200th Street at Highway 1

MAPLE RIDGE
Husky Service
21592 Lougheed Highway

NEW WESTMINISTER
Brunette Cardlock Shell Service
Brunette Street and Braid Street

NORTH VANCOUVER
Capilano Texaco Service
1801 Capilano Road

PRINCE GEORGE
Prince George Taxi
331 First Avenue

Mohawk
835 Central Avenue

PRINCE RUPERT
Far West Fuels
225 - 2nd Avenue West

QUESNEL
Eldorado Recreation
1805 Caribou Highway North

RICHMOND
PetroCanada Island Service
11991 Steveston Highway

Bridgeport Chevron Service
12011 Bridgeport Road at No.5 Road

SMITHERS
Far West Fuels
3348 Highway 16 West

SURREY
Shell Self-Service
9900 King George Highway and Fraser Highway

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BRITISH COLUMBIA (cont'd)

TERRACE
Far West Fuels
4904 Highway 16 West

VANCOUVER
Beachview Service Ltd.
711 Beach Avenue

Cunningham Husky Service
750 W. 70th Avenue

PetroCanada
Fraser and Marine Drive

Granville Service and Parking
(1976 Ltd. (Gulf)
1409 West 6th Avenue at Hemlock

Main and Terminal Esso
1405 Main Street

Shell Service
Broadway and Arbutus Street

Yellow Cab Service
1441 Clark Drive

Airport Gulf Service
Vancouver International Airport

VERNON
Vernon Husky Service
3401 - 32nd Street

WHITEROCK
Mountain View Gulf
2713-152nd Street

WILLIAMS LAKE
Williams Lake Mohawk
1258 S. Broadway

Husky Car & Truck Stop
1335 Hwy 95 South

SASKATCHEWAN

REGINA
CNG Auto Energy Inc.
1850 - 1st Avenue

ALBERTA

AIRDRIE
Airdrie Husky
402 Main Street

BROOKS
ICG Liquid Gas Ltd.
South of Trans Canada Highway
at Overpass

CALGARY
Husky Oil
2525 - 32nd Avenue N.E.

Husky Oil
120 - 10th Avenue S.W.

MEDICINE HAT
Husky Oil
561 - 15 Street S.W.

ONTARIO

BURLINGTON
Pioneer
860 Appleby Line at Harvester

CHATHAM
Ultramar/L'il Papa's
700 Richmond Street

Sunoco
93 Park Avenue East

ETOBICOKE
Shell Service Station
1285 The Queensway at Kipling

Skyline Shell
627 Dixon Road at Kelfield

HAMILTON
Union Gas
360 Strathearn Avenue

Petro Canada
237 Centennial Parkway
(Barton Street and Centennial)

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ONTARIO (cont'd)

KINGSTON
Anglin's Energy Centre
2268 Princess Street

LONDON
Save U Gas Bar
294 Adelaide Street E.

Sunoco
99 Commissioners Rd. W. at McGregor

Sunoco
1253 Wellington Road at Highway 401

MISSISSAUGA
Shell Rapid-Lube
1480 Britannia Road at Dixie Road

PetroCanada
1334 Dundas Street E. at Dixie Road

NORTH BAY
Pro Gas
1848 Seymour Street

NORTH YORK
Shell Canada
3070 Dufferin St. at Lawrence

OTTAWA
Multi Fuels Marts
1515 St. Laurent Blvd.

ST. CATHARINES
PetroCanada
270 Bunting Road

SCARBOROUGH
Al's Shell Service
1201 Markham Rd. at Ellesmere

PetroCanada
2904 Sheppard Ave. E. at Victoria Park

Ultramar/Fiba Canning
2671 Markham Road at Finch

SUDBURY
Davey-Mei Fuels Ltd.
800 Kingsway Avenue

TORONTO
Beaver Station (Shell)
548 Richmond St. E. At Parliament

TUPPERVILLE
Union Gas-Dawn
R.R. #2

WATERLOO
Sunoco
417 King Street at Weber

WINDSOR
Shell Car Wash
Devonshire Mall
3100 Howard

QUEBEC

BOUCHERVILLE
Garage Provost et Fils, Inc.
701 rue des Ateliers

BROSSARD
Station Ultramar
5765 boul. Taschereau

CHICOUTIMI
Station Ultramar
9 rue Price

DORVAL
Station Gulf
550 Montée des Sources

LACHINE
Station Gulf
11000 Côte de Liesse

LASALLE
Station Shell
444 rue Lafleur

LAVAL
Station Shell
1625 boul. St-Martin Ouest

LIMOILOU
Station Taxis Co-op
201 4e rue

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QUEBEC (cont'd)

LONGUEUIL
Station Ultramar
2001 Chemin Chambly

MONTREAL
Station Esso
1030 rue de la Montagne

Station Gulf
225 rue Peel

Station Shell
6201 boul. Décarie

Station Ultramar
9185 rue St. Laurent

Station Ultramar
1330 rue Jarry Est

Station Ultramar
1570 rue Ontario Est

ROUYN
Station Ultramar
1350 Ave. Larivière

SAINT LAURENT
Station Shell
9600 boul. Henri-Bourassa Ouest

SAINT LEONARD
Centre Shell
5200 boul. Métropolitain

SHERBROOKE
Station Shell
3265 rue King Ouest

VERDUN
Station Ultramar
4120 boul. Lasalle

VILLE DE MONTREAL NORD
Station Shell
6505 boul. Henri-Bourassa Ouest

VILLE DE SAINTE-FOY
Station Gulf
2940 Boul. Wilfred Laurier

VILLE DE TROIS RIVIERES
Station Ultramar
5600 boul. Jean XXIII
(coin Côte Richelieu)

L66/3170L

APPENDIX 3

Natural Gas Fueling Station Programs Distribution
by Province - Graph

APPENDIX 3

Natural Gas Fueling Stations

Currently there are 94 public natural gas fueling stations in operation in Canada (3 of them opened without Government assistance). British Columbia has the highest number of stations (40) with Quebec (23) and Ontario (22) in second and third place, respectively.

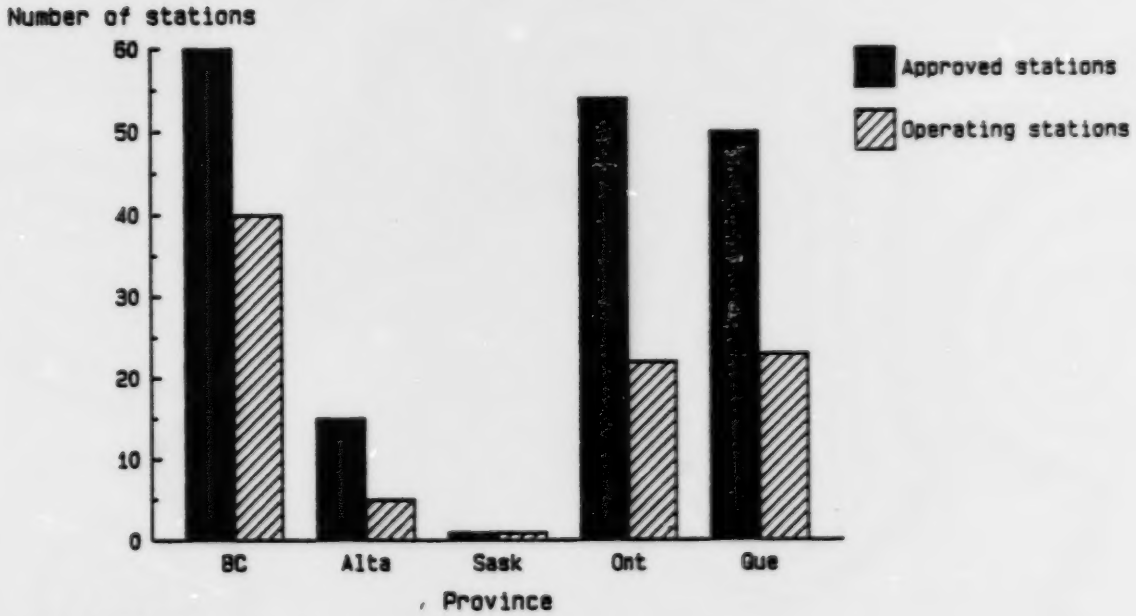
According to program data, by September, 1987 another 42 Stations could be in operation, bringing the total number to 133 natural gas fueling stations across Canada.

Figure 1 gives the national distribution of active and anticipated fueling stations.

The list of active fueling stations is included under Appendix 2.

FIGURE 1

Natural Gas Fueling Station Program
Distribution by Province
August 31, 1986



Source: EMR/TEB
Approved stations must be in operation by March 31,1987.

R321 6279R

APPENDIX 4

BC Research Information Centre

APPENDIX 4

BC Research Natural Gas for Vehicles Information Centre

The BC Research NGV Information Centre is creating a database of publications on NGVs, including academic papers, industry publications, press articles, manufacturers' and distribuors' brochures and so on.

The database and its associated programming are stored in BC Research's Computer System and are available continuously, except between midnight and 3 a.m. Pacific Time (3 a.m. to 6 a.m. Eastern Time).

The following report subjects are typical of the topics covered in the database: spark ignition and compression ignition (diesel) engine conversion to natural gas fuel, NGV conversion kit performance, NG combustion research, NG markets and reserves, public policy and regulations pertaining to NGV fueling of highway vehicles.

Access

The information centre is intended to be accessed either by telephone hook-up from the user's facility, or by logging onto one of the DEC terminals at BC Research Centre.

All users must register their name and password with B.C. Research before using the system. For assistance and instructions on how to access the database, contact BC Research Centre at 3650 Westbrook Mall, Vancouver, B.C. V6S 2I2, or phone (604) 224-4331 ext. 320.

Structure of the data base

Files

In order to use the database, you should understand how it is structured. The main file of "Citations" contains the following information about each article, paper, or other item:

- The Citation # : C 1234 - simply a sequential file number; you can use it to refer back to any particular citation.
- The Date: 1984-01-21 - in year - month - day order; the date of publication. Where the exact date is not specified, only the year or the month are given, e.g. 1982-00-00.
- The Title: full title of the publication.
- The Authors: last name, followed by first name and initials. In the case of co-authors, names are separated by semi-colons.

- The Source: The publishing source is given, usually a publishing house. In the case of an article, the periodical name and issuing volume are also provided.

- The Descriptors: a number of keywords chosen by the B.C. Research reviewer which identify the topics covered in the article or item cited. The keyword library (see below) is made up from these descriptors.

- the Abstract: an abstract of between 15 and 25 lines, summarizes the article and includes further keywords.

A second file, entitled the "Keyword Library", lists all keywords used as Descriptors for the guidance of system users. The keyword library thesaurus may be accessed during a database search.

Programs

The System is user friendly and enables the use of any of the following paths:

1. Search Report Citations: using a selected keyword or series of keywords, the entire database or selected parts of it are searched for items that contain the keywords you chose.

2. Search Keyword Library: using a keyword or series of keywords selected from the keyword library, the descriptor fields of each citation are searched. This provides a quick search of reports which key on the subject of interest. You may also scan the keyword library before selecting keywords for a search.

3. List Citations to Screen: this function lists the citations you have identified to your screen or printer. You have the choice of listing the entire citation or only part of it, e.g. the number, title, author, etc.

4. Print and send hard copies: you may request that a complete copy of any article referred to in the data base be sent to you by mail.

Features

The key skill in the use of any database program is the construction of the "Search String" - the arrangement of keywords that says you want articles about a particular topic or combination of topics but NOT about other topics or combinations. You have the choice of asking for combinations.

The program provides for the successive elimination of citations from a group, by requesting a search of a previously identified group of citations.

Another method of narrowing the search is to request a search of certain database fields only. The title of a cited article will usually express only the main thrust of the article; the descriptors, chosen by the reviewer, will note other main topics mentioned in the articles; and the abstract may introduce some key words mentioned only peripherally. A request for a search of authors can be made if you wish to identify articles by a particular writer. By limiting your search to the citation fields of interest, you will speed up the reply from the program.

Output

You are given the choice of listing the entire citation (all fields), everything but the abstracts, or just the titles. What you choose depends on whether you are looking for any particular item, or whether you wish to scan to see what there is. When outputting, the program will send ten lines at a time, for two reasons:

- to give you the opportunity of stopping the transmission once you have seen what you want;

- so that, on 1200 baud operation, the lines do not roll off the screen before you have had a chance to read them.

If you have a microcomputer with the facility to "capture" what is being received onto disk or into memory, this will not be such a concern.

Requesting Hardcopies:

The program provides the facility, while you are on line, of requesting hard copies of complete articles cited from the B.C. Research library.

APPENDIX 5

Awarness and Attitudes
Towards Natural Gas

APPENDIX 5

Awareness and Attitudes Towards Natural Gas

A survey carried out in June 1986, by an independent consultant for the Canadian Gas Association (CGA) indicates that the image of natural gas is good and steadily improving in Canada.

The study, drawn from a thousand respondents, tracks consumer attitudes and awareness levels from a national perspective. It is the third in a series of annual surveys designed primarily to provide guidance for and measurement of CGA's communication program.

While the survey covered the numerous applications of natural gas, such as home heating, water heating, cooking, clothes drying, etc., we are primarily concerned with the attitudes expressed towards natural gas as an automotive fuel. The findings include:

- 58% of the population surveyed are aware that automobiles can be converted to run on natural gas.

- Nearly as many respondents agree (44%) as disagree (38%) that although they are aware that automobiles can be converted, they are not aware of the difference between propane and natural gas conversions. The level of disagreement increased from 22% in 1985 to 38% in 1986, indicating greater awareness of the conversion difference.

- Willingness to buy a car, which had already been converted to use natural gas, increased slightly during 1985, and at the time of the survey stood at 43%. However, those respondents with a negative attitude are weakening, particularly since 1984 when 49% said they were not at all willing to buy. Willingness of individuals to convert their own vehicle to natural gas was no stronger in 1986 than in 1985, with only 12% responding positively.

- There was some change in attitude by 1986 towards willingness to buy a car capable of running on either gasoline or natural gas.

	1984	1985	1986
very willing	8%	13%	13%
somewhat willing	25%	26%	30%
not too willing	17%	19%	21%
not willing at all	49%	41%	35%

- Willingness to convert one's present car to natural gas in addition to gasoline, knowing that the conversion would cost a minimum of $1,700.00.

	1984	1985	1986
very willing	4%	3%	2%
somewhat willing	13%	9%	10%
not too willing	18%	15%	21%
not willing at all	64%	72%	67%

- When offered the prospect of re-fuelling with natural gas in one's own driveway, the appeal of converting becomes much stronger, with 40% of the respondents now claiming willingness to make the move.

The above research data was collected demographically and psychographically. The psychographic section cross-tabulates responses by respondent lifestyle providing, among other things, target groups' media habits.